

LLNL Environmental Restoration Division (ERD)  
Standard Operating Procedure (SOP)

**ERD SOP 4.3: Sample Containers and Preservation**  
**Revision: 5**



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**APPROVALS:**

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### 1.0 PURPOSE

This procedure defines the sample volume, container, holding time, and preservation method requirements for water, waste, soil, rock sediment, and sludge sampling recommended by the Contract Analytical Laboratories (CALs) and the available regulatory guidance.

### 2.0 APPLICABILITY

This procedure is to be used as a general guide in choosing a sample container and method of preservation for environmental samples collected by the Environmental Restoration Division (ERD).

### 3.0 REFERENCES

- 3.1 U.S. EPA (1993), *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, SW-846, 2nd edition, Washington, D.C.

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- 3.2 U.S. EPA (1992), *40 Code of Federal Regulations*, Chapter 1, Section 136.3, Table II, Washington, D.C.
- 3.3 U.S. EPA (1983), *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, Washington, D.C.

## **4.0 DEFINITIONS**

See SOP Glossary.

## **5.0 RESPONSIBILITIES**

### **5.1 Division Leader**

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

### **5.2 Sample Coordinator (SC), Drilling Coordinator (DC), or Subproject Leader (SL)**

The SC's, DC's, or SL's responsibility is to supply the sampling personnel with a sampling plan that contains the requested analyses, required volume, sample containers, and type of preservation.

### **5.3 Field Personnel**

Field personnel are responsible for collecting the appropriate volume of samples necessary for analysis in the correct containers using the proper preservation technique. In addition, field personnel are responsible for considering sample hold times when collecting samples and shipping to the analytical laboratories.

### **5.4 Quality Control (QC) Chemist**

The QC Chemist is responsible for maintaining a list of appropriate sample volumes, containers, preservation, and hold times for the analyses performed in ERD by the analytical laboratories.

## **6.0 PROCEDURE**

### **6.1 Discussion**

- 6.1.1 Preservation methods are generally limited to pH control, chemical addition, refrigeration, and freezing. Methods of preservation are intended to: retard biological action, hydrolysis of chemical compounds and complexes, and to reduce the volatility of analytes and adsorption effects.
- 6.1.2 Containers can introduce positive or negative errors by contributing contaminants through leaching or surface desorption, and depleting concentrations through adsorption. Therefore, containers such as Borosilicate glass, linear polyethylene, polypropylene, or Teflon should be used for collecting environmental media. If necessary, brass or stainless steel tubes can be used during drilling operations. Do not use other plastic containers or lids and aluminum foil due to possible sample

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contamination from the phthalate esters and other hydrocarbons within the plastic and on the foil surface.

- 6.1.3 All sample containers should be precleaned. VOA vials should be certified clean by the vendor.
- 6.1.4 Due to the short holding times of some constituents, sampling of these should not be performed on Fridays or before holidays. Field personnel should forewarn the laboratories that short hold time samples are pending so that the laboratories can redirect the samples if their workloads prohibit their ability to analyze the samples before the hold time expiration.

## 6.2 Procedure

- 6.2.1 Obtain the sampling plan. A sampling plan may be obtained from the SC, DC, or SL that lists the area and well or location to be sampled, the requested analyses, the analytical laboratory the sample is to be sent, and other sampling information.
- 6.2.2 Consult list of volumes, preservation, containers, and hold times. To locate the list electronically, go to your apple menu and select Chooser. In the Chooser screen select AppleShare, EPD T4383 in the AppleTalk Zone, ERD Public Access Server in the file server, and then select OK. Connect to the server as a Guest and select OK. In the next screen, select Public Folder and OK. The Public Folder icon will appear on the desktop. Double click on it, then open the "Volume, etc." folder then select the Excel file "Volume, Preserv & Hold Times."
- 6.2.3 Determine sample container and/or preservation requirements. Using the sampling plan and the list of volumes and preservation determine the type of bottles, preservatives, holding times, and filtering requirements. Calculate the number of each type of container required and gather sampling materials as listed in the appropriate sampling or drilling SOP.
- 6.2.4 Obtain the appropriate containers from storage. Sample containers are available from the laboratory where samples are to be analyzed. Containers are retrieved from sample bottle inventory. Obtain a cooler and fill with ice (either loose, bagged, or Blue). Blue ice should be bagged and used when shipping samples via Federal Express (see SOP 4.4, "Guide to the Handling, Packaging, and Shipping of Samples"). See SOP 4.9, "Collection of Field Samples" for the required QC sample requirements. Sufficient supplies of sample containers, trip blanks, and water for field blanks should be maintained and stored appropriately.
- 6.2.5 Collect samples. Samples should be collected as described in the appropriate sampling or drilling SOP.  
  
Note: Sample containers should be filled so that the sample does not come into contact with the sampler's gloves, thus potentially causing contamination.
- 6.2.6 Filter samples. Samples requiring filtering (such as dissolved metals), should be filtered in the field, when possible. Samples should be filtered and preserved at the laboratory if a filtration device is not available in the field. The CoC should describe any filtration the laboratory needs to perform.
- 6.2.7 Preserve Samples.

A. If the samples are to be preserved, the sampler should:

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- Consult a QC Chemist to determine the approximate volume of acid (or base) needed to preserve a sample.
- Preserve the appropriate samples using the pre-determined amount of acid (or base).

Note: Samples shipped via common carrier or U.S. Postal Service, must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR part 172), and is the responsibility of the person who prepared the material for shipment to ensure this compliance is met. For the preservation requirements of samples, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation (DOT) has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCL) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); nitric acid (HNO<sub>3</sub>) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and sodium hydroxide (NaOH) in water solutions at concentrations of 0.08% by weight or less (pH about 12.3 or less).

- B. If samples that require preservation at the time of collection cannot be preserved in the field or upon returning from the field, samples are to be preserved by the laboratory immediately upon receipt. This should be clearly noted on the CoC. In all cases, samples are to be preserved within 12 h from the time of collection, except in the instances where the samples can be analyzed within their unpreserved holding time.
  - C. Radiological samples must be sent to the laboratory within 5 days of sample collection.
- 6.2.8 Keep samples at the proper temperature. Samples requiring refrigeration of 4°C must be protected from getting wet. Samples must be immediately placed in an ice chest containing either Blue Ice packs (in air-tight plastic bags), or bagged or loose ice cubes. A temperature blank should always be included in the ice chests so the laboratory can check the temperature of the cooler at time of sample receipt. If samples are not submitted to the laboratory daily, ice chests should be checked periodically and thawed ice replaced.
- 6.2.9 Document Preservation. Note sample preservation methods in sampling logbook, on sample label, and on CoC as appropriate.
- 6.2.10 Return unused sample containers to their appropriate place.

## 7.0 QA RECORDS

- 7.1 Completed Chain-of-Custody forms
- 7.2 Document Control Logbooks and field sheets

## 8.0 ATTACHMENTS

Not applicable.